5E1342

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B.Tech. V- Semester (Main) Examination, Nov. - 2019

PCC/PEC Civil Engineering

5CE4-02 Structural Analysis - I

Time : 2 Hours

Maximum Marks : 80

Min. Passing Marks : 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory **(5×2=10)**

1. Define the term indeterminacy.
2. Write down the type of support provided in structure with their number of reaction components.
3. Differentiate between static and kinematic indeterminacy.
4. Define the term stiffness for springs.
5. Elaborate Maxwell's Reciprocal theorem.

PART - B

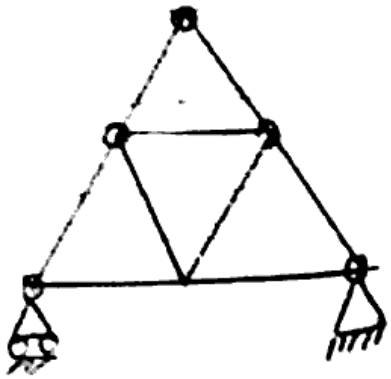
(Analytical/Problem solving questions)

Attempt **any four questions** **(4×10=40)**

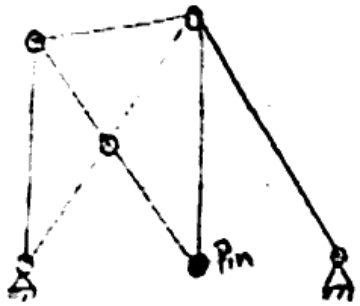
1. Determine the static indeterminacy of the followings :

a)

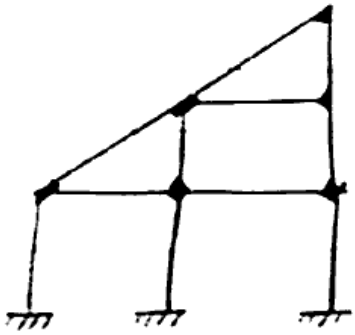
b)



c)



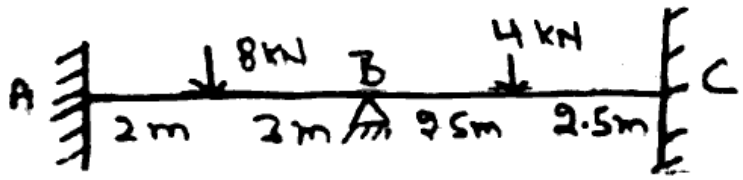
d)



(Rigid Frame)

2. State the D'Almbert's principle. Explain its application with example.

3. Using slope deflection method, compute the end moments and plot the bonding moment diagram. (EI = Constant)



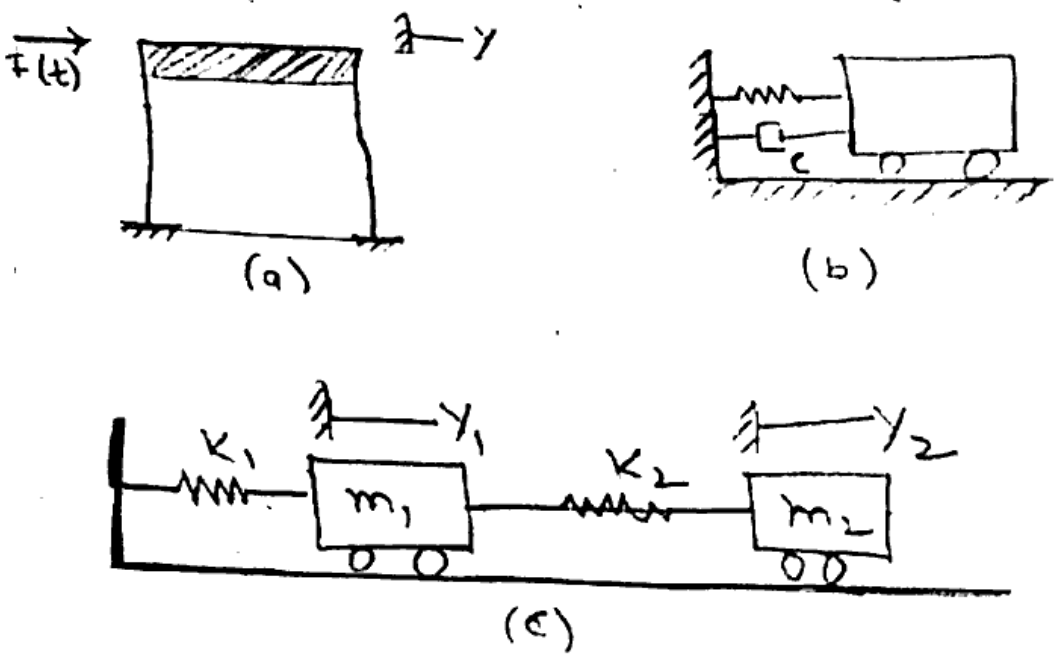
4. Define the terms :

   i) Critical damping

   ii) Logarithmic decrement

5. Derive an equation which gives the relationship between natural frequency and the static deflection of the system.

6. What do you understand by degree of Freedom. How many degrees of freedom can be taken in each case in the figure given below for simplicity :-

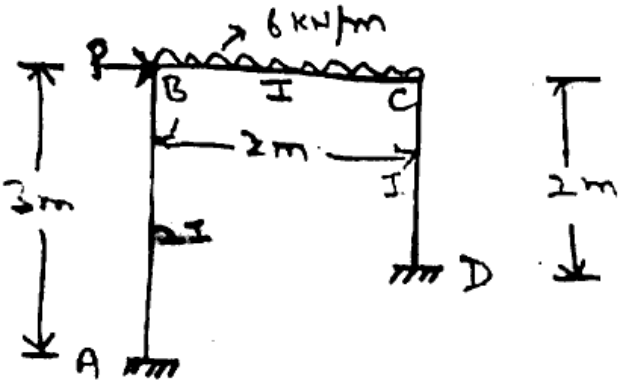


PART - C

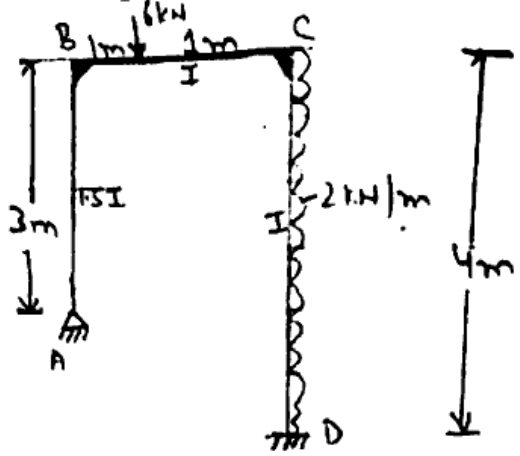
(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any two questions **(2×15=30)**

1. Calculate the Bending moment and draw Bending moment diagram with deflected shape of frame as shown in fig. (Using moment distribution method)

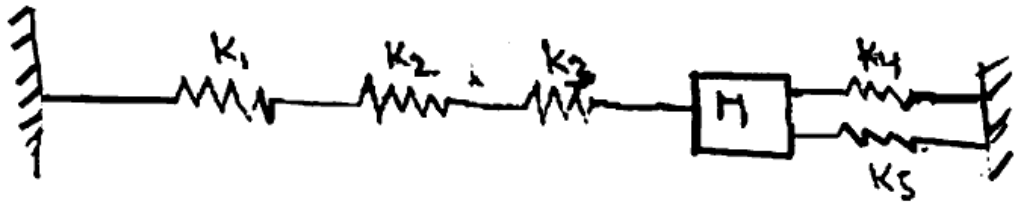


2. Using slope - deflection method calculate Bending moment and draw Bending moment diagram and deflected shape of the frame.



3. a) Derive an equation which gives the relationship between natural frequency and static deflection of the system. **(8)**

b) For the system shown in fig. Find M. Such that system has natural frequency of 10 Hz.



$k_1 = 2200$ N/m, $k_2 = 1800$ N/m, $k_3 = 3200$ N/m, $k_4 = k_5 = 550$ N/m **(7)**